

11300
15C/tjh
16 SEP 97

From: Commander, Naval Facilities Engineering Command (Code 15C)
To: Distribution

Subj: EMERGENCY SHOWER AND EYEWASH STATIONS, INTERIM TECHNICAL
GUIDANCE (ITG)

Ref: (a) MIL-HDBK-1003/7, Steam Power Plants - Fossil Fueled
(b) MIL-HDBK-1005/7, Water Supply Systems
(c) MIL-HDBK-1005/8, Domestic Wastewater Control
(d) MIL-HDBK-1005/9, Industrial and Oily Wastewater Control
(e) MIL-HDBK-1005/13, Hazardous Waste Storage
(f) MIL-HDBK-1015/1, Electroplating Systems
(g) MIL-HDBK-1028/1B, Aircraft Maintenance Facilities
(h) Design Manual 28.4, General Maintenance Facilities

Encl: (1) "Design Guidance for Emergency Shower and Eyewash Stations", 29 Aug 97
(2) Proposed Revisions to NFGS-15400, "Plumbing Systems"

1. Purpose. To provide interim technical guidance for provision of emergency shower and eyewash stations (ES/EWS). The guidance may be retained for record purposes until it is incorporated into the criteria as noted in paragraph 4.

2. Background. Emergency showers and eyewash stations are required to be provided at certain locations, by statutes, regulations, codes, and Navy criteria. They are intended to provide protection for personnel handling or otherwise exposed to hazardous materials. The ES/EWS provides protection by means of immediately flushing the offending substances off of the clothing and person with large quantities of potable water. The required ready accessibility and large water flows present an incidental hazard to the material stored in the vicinity and to the facility. Routine testing of ES/EWS involves flowing water and operators voiced a strong preference for floor drains in a recent NAVOSH survey. Also field reports of damage caused by ES/EWS running unattended for long periods, combined with non-provision of floor drains to safely contain the water flow, indicate that specific guidance is needed for the application of ES/EWS to insure protection of personnel, stored material, and the facility. Examination of the existing Navy criteria, references (a) through (h), and other documents, along with careful consideration of alternatives, has resulted in the drafting of enclosure (1). Enclosure (2) indicates suggested modifications to NFGS-15400, that will be reviewed, finalized, and issued by NAVFAC, Civil Engineering Support Office.

16 SEP 97

Subj: EMERGENCY SHOWER AND EYEWASH STATIONS, INTERIM TECHNICAL GUIDANCE (ITG)

3. Technical Guidance. Enclosure (1) is the new design guidance for emergency shower and eyewash stations, which is applicable to all sites. It coordinates and consolidates the functional requirements, and indicates the acceptable system types for the various classifications of hazardous materials site conditions.

4. Action.

a. Construction. Modify Navy projects currently under construction and amend advertised construction projects to conform to the enclosed policy where funds and schedule permit.

b. Design. Design all new projects using this guidance. Revise all projects under design, but not completed, to comply with the policy where funds and schedule permit.

c. Criteria.

(1) The NAVFAC Criteria Office: Revise the appropriate sections of references (a) through (h).

(2) Guide Specifications Division: Revise impacted guide specification to comply with this guidance.

5. Coordination. This ITG has been coordinated within NAVFAC Headquarters, Planning and Engineering Support Directorate, Code 15; Public Works Support Directorate, Code 13; Facilities Programming and Construction Directorate, Code 30; Safety and Health Division, Code 40K; Engineering Field Divisions, North, Atlantic, South, Southwest, and Pacific; Engineering Field Activities, West, Chesapeake, Midwest, Northwest, and Mediterranean; Public Works Centers; CESO 158; NFESC ESC 64; and copies were provided to the U. S. Army Corps of Engineers, CEMP-ET; and U. S. Air Force, Civil Engineers Support Activity, AFCESA-ENM.

6. Points of Contact. For additional information concerning ES/EWS, the following points of contact are provided: NAVFAC Criteria Office - Mr. Thomas J. Harris, P.E. at DSN 262-4206, commercial 757-322-4206, FAX at 4416, or via Internet at HARRIS@efdlant.navfac.navy.mil; and Guide Specifications Division - Mr. F. Deleon at DSN 551-5743, commercial 805-982-5743, FAX at 5196.

P. N. BOLTON
By direction

16 SEP 97

Subj: EMERGENCY SHOWER AND EYEWASH STATIONS, INTERIM TECHNICAL
GUIDANCE (ITG)

Distribution:

COMNAVFACENGCOM (15, 13, 30)
LANTNAVFACENGCOM (04, 18, 20)
SOUTHNAVFACENGCOM (076/Dennis)
NORTHNAVFACENGCOM (4013/D'Armi)
SOUTHWESTNAVFACENGCOM (406/Flach)
PACNAVFACENGCOM (406/Takushi, 04/Higashihara)
ENGFLDACT WEST (09F41/Pittman)
ENGFLDACT CHESAPEAKE (406/Trechsel)
ENGFLDACT MIDWEST (420/Kang)
ENGFLDACT NORTHWEST (04B/Jones)
ENGFLDACT MEDITERRANEAN (N4/Cook)
PWC PENSACOLA (420/Cristea)
PWC YOKOSUKA (400/Kamimoto)
PWC SAN FRANCISCO (40/Lee)
PWC GREAT LAKES (422/Harmon)
PWC JACKSONVILLE (420/Simes)
PWC NORFOLK (424/Jones)
PWC PEARL HARBOR (421/Kaya)
PWC SAN DIEGO (400/Allison)
PWC WASHINGTON (410/Capozzoli)
PWC GUAM (423/Moguel)
CESO (158)
NFESC (ESC 64/Biggers)
USACOE (CEMP-ET/Dale Otterness)
USAF CESA-ENM (Gerald Doddington)
PWC NORFOLK (NAVFAC 40K/Cradock)

.

Blind copy to:

15C/tjh

15C(RF)/ssf

c:/mydocuments/harris/esewscvr.doc

DESIGN GUIDANCE FOR EMERGENCY SHOWER AND EYEWASH STATIONS

1. EMERGENCY SHOWER AND EYEWASH STATIONS (ES/EWS) - Provide ES/EWS meeting ANSI Z 358.1 where required by Occupational Safety and Health Act (OSHA) regulations or by other competent authority, such as NAVOSH, Military Handbooks, or Design Manuals. Consult with the local station, EFA, and EFD authorities, including the process, environmental, and safety engineers, and the Industrial Hygienist about ES/EWS locations, materials present, waste treatment systems available, and permits required. Locate ES/EWS as close to the hazard as possible, within 10 to 20 feet for highly corrosive chemicals, but not more than 10 seconds or 100 feet of unobstructed travel away, whichever is lesser.

a. For personnel protection within water-reactive (W/R) hazardous materials storage and handling areas, provide ANSI Z 78.1 chemical splash goggles, consider providing portable ANSI Z 358.1 personal eyewash (PEW) protection, for use within the W/R area, and provide ES/EWS immediately outside the W/R area, but not more than the 10 seconds or 100 feet away from the work location. Ensure water from ES/EWS will not enter the W/R area; this may require provision of partitions, walls, berms, trenches, or curbs. The PEW should be of the smallest reasonable volume necessary to enable initial flushing on the way to the ES/EWS, to minimize the W/R hazard due to spillage of the flushing fluid. A W/R material spill is the most probable cause of the need for flushing, and the spillage of the flushing fluid provides the other chemical needed to initiate the reaction. Carefully consider whether to provide PEW or not, and document the decision analysis. PEW fluid presence may increase the risk of a W/R chemical event due to risk of accidental PEW fluid spill, and due to valid usage of PEW. W/R materials are defined in MIL-HDBK-1005/13 and MIL-HDBK-1032/2.

2. ALARMS - Provide a waterflow-initiated alarm for each ES/EWS. For locations where potable water is not available, provide PEW protection and a manually initiated alarm. Provide a local audible signal device, a silencing switch, and a flashing strobe light for each ES/EWS and for each manual alarm, and optionally provide central reporting of the alarm to a 24 hour per day manned location. Alarm installations shall be waterproof per NEMA Class 3. ES/EWS alarm systems in hazardous (classified) locations, per National Electric Code, shall be listed and labeled for that purpose. Alarm audible signal devices shall have a distinct sound, different from other alarms in this and adjacent facilities. Mount alarm audible signal device, silencing switch, and strobe light on wall or ES/EWS column, immediately above the level of the shower head.

Alarms protect people by promptly summoning help, and protect stored materials, equipment, and facilities by indicating or reporting ES/EWS activation, with its attendant waterflow.

3. FLOOR DRAINS - Floor drains for ES/EWS are not required by the International Plumbing Code (IPC) 1997 edition, see Section 411.

- a. Owners and occupants prefer floor drains, for housekeeping and for material and facility protection reasons.

The floor drain may become a source of illicit disposal of prohibited substances. Careful supervision will be necessary.

- b. Floor drains may be provided. The Environmental Protection Agency regulation, 40 CFR 261, describes “...the following mixtures of solid wastes and hazardous wastes listed in Subpart D are not hazardous wastes...” “...“de minimis” losses include ...” “...discharges from safety showers and rinsing and cleaning of personal safety equipment;...”. Therefore, ES/EWS discharges may be drained to the sanitary sewer system, as they are “de minimis” losses.

- c. Floor drains, where provided, should comply with the following:

- 1) Minimum capacity of 45 gallons per minute water flow, based upon 1.5 times the ANSI Z 358.1 Standard water flow minimum requirement.

The floor drain must accommodate the full flow of the ES/EWS to avoid spilling water over the containment curb, into the hazardous material storage area, and to avoid damage to the material and the facility in case of continuous ES/EWS operation.

- 2) Floor drains should be provided with 4 inch deep seal traps. Frequent testing of the ES/EWS, as required by ANSI Z 358.1, will refill the trap seal.

The deep seal trap is provided to reduce the problem of the unused trap drying out and allowing the back flow of sewer gases, fumes, and vermin into the space. Weekly testing of the ES/EWS will be usage enough to refill the trap seal; otherwise, provide an automatic trap priming valve connected to the cold water supply to maintain the trap seal.

- 3) Provide a 1.5 inch high ES/EWS containment curb completely around the ES/EWS, slope the exterior (approach) face of the curb up at a slope of 1 inch rise in 12 inches horizontal, but not more than 1 inch rise in 8 inches per Uniform Federal Accessibility Standards (UFAS) 4.1.6, mark the ES/EWS curb as a trip hazard per OSHA regulations, and inform the personnel that the ES/EWS curb exists. Where ES/EWS with floor drains are located within hazardous material (hazmat) spill containment bermed or curbed areas, provide the crest of the ES/EWS curb to be 1.5 inches higher than the surrounding hazmat area curb, to ensure spills do not enter the floor drain. See the attached sketch.

The ES/EWS containment curb protects the floor drain from accidental spills in the surrounding hazmat area. The ES/EWS curb also protects the stored hazmat materials and facility from accumulated ES/EWS water flow by directing the flow into the floor drain.

- 4) Post a placard at each ES/EWS stating: “**NO DUMPING.** This drain discharges untreated into the sanitary sewer, contact Activity Environmental Office for proper disposal of spilled material or waste.”

The placard provides the occupants with sufficient information to avoid inadvertent “spills” caused by using the floor drain as a convenient sink for cleanup of spilled materials. Designer to revise the wording to correctly indicate the discharge destination and if it passes through a treatment system such as a neutralization tank or an oil-water separator.

- d. Floor drains, where provided, should connect to drain as follows:

- 1) Extraordinary hazard materials - such as poisons, shall **not** discharge into a drain system. Utilize the hazmat spill containment curb system to contain the ES/EWS water flow. Provide remote alarm reporting to a central manned station. Immediate action is required to prevent poison contaminated water from spreading throughout the facility.

The floor drain is omitted to prevent inadvertent exposure of persons downstream of the floor drain from unknowingly contacting the potentially poisonous runoff. The hazardous material spill response team answering the alarm will be aware of the hazards and capable of taking appropriate measures for self protection. If the hazmat spill containment curbed area has insufficient volume to hold a minimum of 30 minutes of ES/EWS water flow, provide a floor drain to an above ground holding tank sized to hold at least 30 minutes of flow. Properly label the piping and the tank as holding poisonous fluids. Provide a hazmat spill containment berm around the holding tank. Provide an ES/EWS containment curb around the floor drain to preclude fire protection water from flooding the floor drain holding tank and tank berm. ES/EWS curb to be 1.5 inches higher than the hazmat curb.

- 2) Plating shops - Drain to the proper industrial waste treatment system. Segregate cyanide wastes, including ES/EWS drainage, from all acid wastes. Segregate hexavalent chromium wastes, including ES/EWS drainage, from all caustics and cyanides. Where the shower is located in a multiple use area, such as a material handling or shipping/receiving area, drain to the proper industrial waste treatment system.

- 3) Battery rooms or shops - Drain to the proper neutralization tank, if provided; otherwise, drain to the sanitary sewer system. Segregate caustics from

the Nickel-Cadmium-Alkali battery area, including ES/EWS drainage, from acids. Segregate acids from the Lead- Acid battery area, including ES/EWS drainage, from caustics. Do not allow mixing of acid and alkali wastes in the drains.

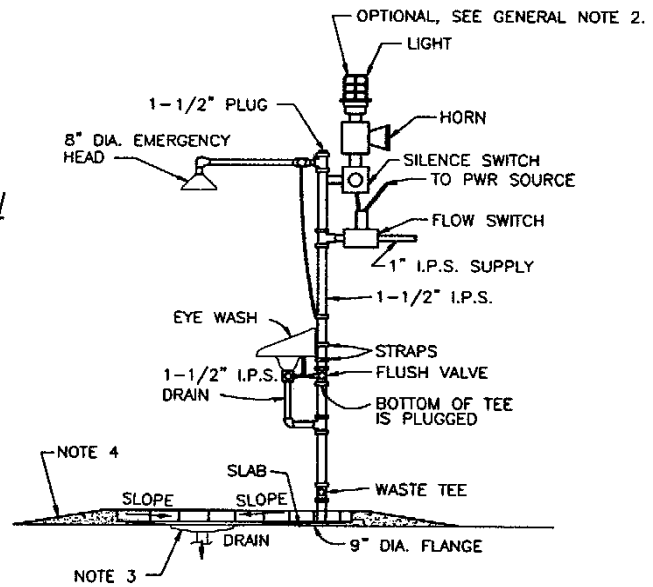
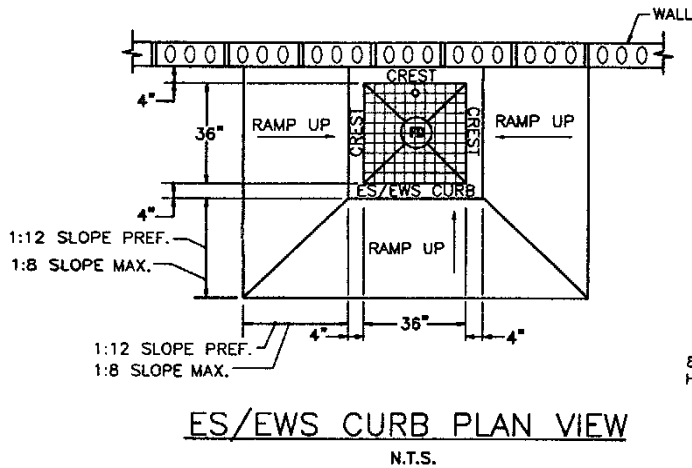
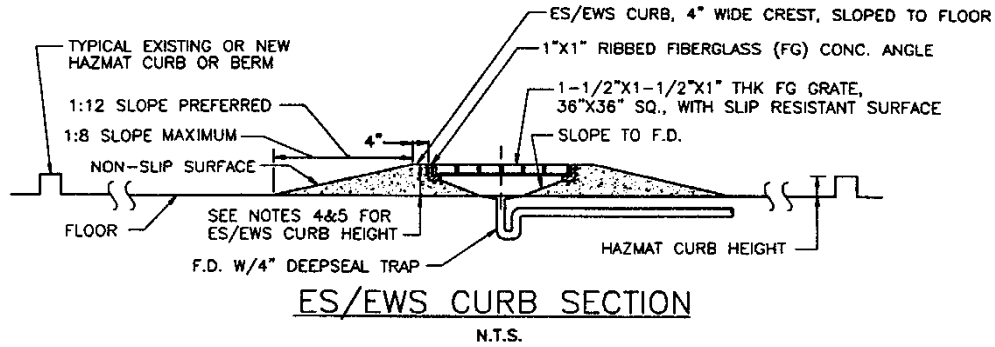
4) Oily Waste shops - Drain to the oil/water separator, if provided; otherwise, drain to the sanitary sewer system. Typical oily waste shops include the following: paint shops and hangers, paint mix rooms, paint equipment rooms, engine shops, ground support equipment (GSE) shops, refueler shops, Public Works automotive shops, locomotive and crane shops.

5) Miscellaneous materials - Drain to the sanitary sewer system.

6) Exterior ES/EWS - Slope impervious-surfaced grade to drain to a bermed or curbed impervious-surfaced area to allow cleanup without “spillage” to the environment; or provide a floor drain connected to an appropriate drain system, and an enclosure with roof to preclude storm water entry into the floor drain. Provide the ramp, curb, and grate around the floor drain, to preclude surface drainage into the floor drain.

Note: All drain connections must comply with all national, state, local, and Navy regulations. Coordinate this issue with the local authorities per paragraph 1. above.

4. ELECTRICAL - Provide Ground Fault Interrupter (GFI) protection for dedicated heat tape circuit, if provided, and for all electrical power outlets within 6 feet of an ES/EWS and below the elevation of the shower head.



EMERGENCY SHOWER & EYE WASH (ES/EWS) DETAIL

GENERAL NOTES:

1. DETAILS SHOWN NOT TO SCALE.
2. DESIGNER SHALL DETERMINE ALARM, LIGHTING AND MONITORING REQUIREMENTS.
3. FLOOR DRAIN (FD) IS OPTIONAL, SEE ES/EWS ITG.
4. IF FD PROVIDED, PROVIDE MINIMUM ES/EWS FD CURB HEIGHT = 1-1/2 INCHES.
5. FOR ES/EWS WITH FD, WITHIN A HAZMAT CURBED OR BERMED AREA, PROVIDE ES/EWS FD CURB HEIGHT= HAZMAT CURB HEIGHT PLUS 1-1/2 INCHES, TO ENSURE NO HAZMAT SPILL ENTERS THE FD.
6. PROVIDE FREEZE PROTECTION, WHERE NECESSARY.
7. PROVIDE SHOWER CURTAIN AND SUPPORT ROD, FOR INDOOR USE.
8. PROVIDE ENCLOSURE FOR OUTDOOR USE, DRAIN TO A CURBED OR BERMED AREA.
9. IF FLOOR DRAIN IS NEEDED OUTDOORS, PROVIDE AN ES/EWS FD, CURB & GRATING, TO EXCLUDE STORM WATER FROM ENTERING TO FLOOR DRAIN.

PROPOSED REVISIONS to NFGS-15400, PLUMBING SYSTEMS:

Notes to the Designer:

1. Where required by local or other authorities, or where necessary, provide a pressure-compensated tempered water supply, with temperature held between 60F and 95F, for all ES/EWS connected to the potable water system, including those installed outdoors. Ensure the water heater system is sized to include the full flow of at least one ES/EWS for not less than 15 minutes.

Water too cold may cause the victim to leave the shower too soon, thereby increasing the risk of injury.

Water too warm may scald the victim, who needs to stay in the shower, and any chemical reactions present will increase in rate with increasing temperature.

2. Where freezing conditions are anticipated, add the following to the appropriate specification sections:
“Provide thermostat-controlled self-limiting heat tape and PVC-covered elastomeric cellular pre-formed pipe insulation for freeze protection, where indicated. Freeze protection is required for water supply and waste drain piping, in addition to the Emergency Shower and Eye and Face Wash assembly.” “Provide a dedicated ground fault protected electrical circuit for the heat tape.”

2.4.21 Emergency Shower (P-[____])

ANSI Z358.1, wall-mounted self-cleaning, non-clogging 250 mm (10 inch) diameter [copper alloy] [stainless steel] deluge shower head with elbow, 25 mm (one inch) full-flow stay-open ball valve with pull rod and 200 mm (8 inch) diameter ring or triangular handle, 25 mm (one inch) interconnecting fittings, with shower head 2 meters (7 feet) above floor and 610 mm (2 feet) from wall. Shower shall deliver a minimum of 2 L/s (30 gpm) of water at an inlet supply of 207 kPa (30 psi). **[Provide packaged, U. L. listed, alarm system; including an amber strobe lamp, horn with externally adjustable loudness and horn silencing switch, mounting hardware, and waterflow switch, assembled and prewired for NEMA 3 waterproof [and NEMA 4 explosion proof] service.]** [Provide a pressure-compensated tempering valve, with leaving water temperature setpoint adjustable throughout the range 60 degrees F to 95 degrees F] [Provide privacy curtain and rail, for indoor use.] [Provide an privacy enclosure for outdoor use; with roof, if a floor drain is provided.]

2.4.22 Emergency Eye and Face Wash (P-[____])

ANSI Z358.1, wall-mounted self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor. Unit shall deliver 0.19 L/s (3 gpm) of aerated water at 207 kPa (gage) (30 psig) flow pressure, with eye and face wash nozzles 838 to 1143 mm (33 to 45 inches) above finished floor. Provide copper alloy control valves. **Provide an air-gap with the lowest potable eye and face wash water outlet located above the overflow rim by not less than the International Plumbing Code minimum, per IPC Table 608.15.1.** [Provide packaged, U. L. listed, alarm system; including an amber strobe lamp, horn with externally adjustable loudness and horn silencing switch, mounting hardware, and waterflow switch, assembled and prewired for NEMA 3 waterproof [and NEMA 4 explosion proof] service.] [Provide a pressure-compensated tempering valve, with leaving water temperature setpoint adjustable throughout the range 60 degrees F to 95 degrees F.]

2.4.23 Combination Emergency Shower and Eye and Face Wash (P-[____])

ANSI Z358.1, column mounted on a floor flange. Design combination unit so components can be operated individually from a common fixture supply line. **Provide a self-cleaning, non-clogging 250 mm $\sim 10\text{ inch}$ diameter [copper alloy] [stainless steel] deluge shower head with elbow, 25 mm $\sim \text{one inch}$ full-flow stay-open ball valve with pull rod and 200 mm $\sim 8\text{ inch}$ diameter ring or triangular handle, 25 mm $\sim \text{one inch}$ interconnecting fittings, with shower head 2 meters $\sim 7\text{ feet}$ above floor and 610 mm $\sim 2\text{ feet}$ from wall. Shower shall deliver a minimum of 2 L/s $\sim 30\text{ gpm}$ of water at an inlet supply of 207 kPa $\sim 30\text{ psi}$. Provide a self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor. Unit shall deliver 0.19 L/s $\sim 3\text{ gpm}$ of aerated water at 207 kPa (gage) $\sim 30\text{ psig}$ flow pressure, with eye and face wash nozzles $838\text{ to }1143\text{ mm}$ $\sim 33\text{ to }45\text{ inches}$ above finished floor. Provide copper alloy control valves. Provide an air-gap with the lowest potable eye and face wash water outlet located above the overflow rim by not less than the International Plumbing Code minimum, per IPC Table 608.15.1. [Provide packaged, U. L. listed, alarm system; including an amber strobe lamp, horn with externally adjustable loudness and horn silencing switch, mounting hardware, and waterflow switch, assembled and prewired for NEMA 3 waterproof [and NEMA 4 explosion proof] service.] [Provide a pressure-compensated tempering valve, with leaving water temperature setpoint adjustable throughout the range 60 degrees F to 95 degrees F .] [Provide privacy curtain and rail, for indoor use.] [Provide an privacy enclosure for outdoor use; with roof, if a floor drain is provided.]**